

Master of Science in Telecommunication Networks Comparison of Current and Revised Program

CURRENT REQUIREMENTS (36 units, 12 courses):	REVISED REQUIREMENTS (30 credits, 10 courses):
<p>Required Core Courses: must take 6 required courses, 3 unit each, total 18 units, and maintain 3.0 GPA among these courses</p> <p>EL 536 Principles of Communication Networks EL 537 Internet Architecture and Protocols or CS 684 Network Protocols I EL 637 Local and Metropolitan Area Networks or EL638 High speed networks CS 613 Computer Architecture I or CS 623 Operating Systems I CS 627 Performance Evaluation of Computer Systems or EL 7353 Communication Networks I CS 682 Network Management & Security</p> <p>Project (EL995 or CS687): 3 units</p> <p>Program Electives: 9 units Choose 3 courses (3 unit each) from a given list including EL, CS and Management courses</p> <p>Other electives: 2 EL or CS courses, 6 units</p> <p>GPA Requirement: GPA among core courses ≥ 3.0; GPA among all courses ≥ 3.0.</p>	<p>Required Core Course: choose 5 courses out of the following, 3 credit each, total 15 credits</p> <p>EL 5363 Principles of Communication Networks (Required) EL 5373 Internet Architecture and Protocols or CS 6843 Network Protocols I EL 6373 Local and Metropolitan Area Networks or EL6383 High speed networks CS 6133 Computer Architecture I or CS 6233 Operating Systems I CS 6273 Performance Evaluation of Computer Systems or EL 7353 Communication Networks I CS 6823 Network Management & Security</p> <p>Project (EL9953 or CS6873): 3 credits</p> <p>Program Electives: 12 credits Choose 4 courses from a given list including EL, CS and Management courses. No more than two MG courses.</p> <p>GPA Requirement: GPA among core courses ≥ 3.0; GPA among all courses ≥ 3.0.</p>

Master of Science in Telecommunication Networks

Revised 30 Credit Program Description, Effective Fall 2007

Telecommunications is a rapidly growing field. From the military communications networks of the early 1950s, telecommunications technology has evolved to find applications in almost all areas of modern society including, banking, reservation systems, office information systems, corporate networks and the Internet and World Wide Web. Recent challenges include gigabit optical networks, multimedia communications and wireless network access. The rapid evolution of telecommunications technology demands a broad educational background including today's technological breakthroughs. Polytechnic's master's program in telecommunication networks contains a wide variety of courses ranging from fundamental topics to recent technological advances.

GOALS AND OBJECTIVES

The objective of the Master of Science in Telecommunication Networks (MSTN) is to prepare students for a profession in telecommunication networks. The program trains students to understand, design, manage and operate telecommunication networks. The unique features of the program are:

- An exceptionally wide range of course offerings in telecommunications
- Graduate laboratory courses in networking offering hands-on experience
- Professors with extensive experience in research, industry and teaching
- Interaction with Polytechnic's New York State Center for Advanced Technology in Telecommunications, where students have access to research and development projects

REQUIREMENTS FOR THE MASTER OF SCIENCE

Admission to a Master of Science in Telecommunication Networks requires an undergraduate degree in computer science, computer engineering or electrical engineering, with a superior undergraduate record from an accredited institution. The Graduate Record Exam (GRE) is recommended. Applicants having comparable degrees in other fields will be considered for admission on an individual basis. Generally, entering students are expected to have a basic knowledge of computer fundamentals, such as programming in C++, data structures and computer architecture. Students having superior academic credentials but lacking sufficient background are admitted with conditional status pending satisfactory completion of several individually specified preparatory courses. These preparatory courses include CS 5303 Introduction to Computer Science and CS 5403 Data Structures. However, no credit will be allowed for any of the preparatory courses toward this degree. Other preparatory courses may be required. In some cases students will be invited to an interview to determine the necessary preparatory courses they need to complete. Successful completion of the preparatory courses with a 3.0 GPA or better is a necessary condition for transfer to regular status. Admission with advanced standing is accepted in accordance with Polytechnic regulations published in this catalog. A maximum of 9 credits may be applied to the MS in Telecommunications Networks from previous graduate work at an acceptable institution. To satisfy the requirements for a master's degree, students must complete a total of 30 credits as described below, with an overall

average of 3.0. In addition, a 3.0 average is required in the core courses described in GROUP1 and GROUP2 below. Students who have satisfactorily completed equivalent courses, as determined by the MSTN advisor, may be allowed to replace required core courses in Group1 and 2 courses with other courses, starting with the remaining Group 2 course. For example, a student who has previously taken a course equivalent to EL 5373 will be required to take all the remaining four courses in Group 2. If a student has previously taken two or more equivalent courses from Group 1 and 2, these additional courses can be replaced by advanced courses. Permission of the MSTN advisor is required for all course substitutions.

GROUP 1: Required Core Course

3 Credits

EL 5363 Principles of Communication Networks

Students who have satisfactorily taken a course equivalent to EL 5363, e.g., EE 136, or otherwise as determined by the MSTN advisor, can replace this course by a course from Group 2, as explained above.

GROUP 2: Additional Core Courses

12 Credits

Students are required to take 4 out of the 5 courses listed below.

1. EL 5373 Internet Architecture and Protocols or CS 6843 Network Protocols I
2. EL 6373 Local and Metropolitan Area Networks or EL6383 High Speed Networks
3. CS 6133 Computer Architecture I or CS 6233 Operating Systems I
4. CS 6273 Performance Evaluation of Computer Systems or EL 7353 Communication Networks I (the latter requires EL 5363 and EL 6303 as prerequisites)
5. CS 6823 Network Management & Security

In certain rare circumstances, and with approval of the program's director, other computer science and electrical engineering courses may be used to fulfill the core requirement. Students may not take both CS 6843 and EL 5373.

GROUP 3: Project Requirement

3 Credits

All students in the Telecommunication Networks Program are required to take a project course, either CS 6873 Project in Telecommunication Networks or EL 9953 Advanced Project I, depending on whether the project advisor is from the CS or ECE departments, respectively. Students must obtain a project adviser and have a project plan approved before registering. The project should be completed in one semester. After obtaining the program director's approval, students may substitute the required 3-credit project with a 6-credit MS thesis. The extra 3 credit for the thesis will be counted towards the program elective in GROUP 4.

GROUP 4: Program Elective Courses

12 Credits

Students are required to take four courses (not already counted towards the core requirement) from the following partial list of courses. Other courses are possible with the approval of the program director.

EL 5013 Wireless Personal Communication Systems
EL 5143 Multimedia Laboratory
EL 6013 Principles of Digital Communication
EL 6023 Wireless Communications
EL 6033 Modern Wireless Communication Techniques & Systems
EL 6063 Information Theory
EL 6303 Probability
EL 6313 Engineering Applications of Stochastic Processes
EL 6383 High-Speed Networks
EL 6393 Advanced Network Security
EL 7353 Communications Networks I
EL 7363 Communications Networks II
EL 7373 High-Performance Routers and Switches
EL 9303 Wireless Information Systems Lab
CS 6033/6043 Design & Analysis Algorithms I/II
CS 6133/6143 Computer Architecture I/II
CS 6233/6243 Operating Systems I/II
CS 6063 Software Engineering I
CS 6083 Principles of Database Systems
CS 9053 Introduction to Java Programming

MG graduate courses: Relevant graduate course in the management department can be taken with the approval of the MS Telecommunication Networks advisor. No more than two MG courses can be counted towards the MSTN degree.

Total: 30 Credits

Catalog Descriptions of Core Courses (3 Credit Each)

EL5363 Principles of Communication Networks

This course covers all the fundamental aspects of communications networks. Topics being discussed are: protocol architecture, data transmission and signal encoding, multiplexing, spread spectrum, data link control, local area networks, wireless LAN, circuit switching, packet switching, routing, traffic control, Internet protocol, transport layer protocol, application design and the basics of network security.

Prerequisites: MA3012 or instructor's permission

EL5373 Internet Architecture and Protocols

This course introduces the student to some basic local area networking technologies and protocols in a set of lectures and laboratory experiments. Link level protocols. Local area networks: CSMA/CD, Token Ring, IEEE standards and protocols. The Internet protocol suite: IP, ARP, RARP, ICMP, UDP and TCP. LAN Interconnection: bridges, routers and gateways. Application protocols: SNMP, FTP, SMTP and NFS.

Prerequisite: EL5363 or EE136

EL6373 Local and Metropolitan Area Networks

The purpose of this course is to introduce students to the fundamental design issues in wireless and wired local and metropolitan area networks, explain the state-of-the-art solutions proposed and deployed in the field by using latest standards and protocols as examples, and discuss the trends in the wireless/wired LAN/MANs. Example wireless technologies covered include the IEEE 802 family of protocols, e.g., WiFi, WiMax and Bluetooth. Example wireline technologies include those associated with Ethernet, and MAN technologies such as Resilient Packet Ring.

Prerequisites: EL5363 or EE136 or instructor's permission

EL6383 High-Speed Networks

This course covers the basics, architectures, protocols, and technologies for high-speed networks. Topics to be included are: synchronous optical network (SONET), asynchronous transfer mode (ATM), ATM adaptation layer (AAL), 10/100/1000/10G Ethernet, Ethernet over SONET (EOS), quality of service control, packet scheduling, network processor, buffer management, flow and congestion control, TCP, high-speed TCP and XCP, Routing and IP fast rerouting, WDM networks, MPLS and GMPLS. Each student is also required to complete a project that could be reading, software design or hardware design.

Prerequisites: Graduate status, EL 5363 or EE 136 or equivalent

EL7353 Communication Networks 1

The purpose of this course is to introduce students to the analytical techniques used in the design and performance analysis of networks. Building on their knowledge of networking technology and applied mathematics, especially probability, students will start by learning basic queueing theory. This will be applied to the performance analysis of multiplexers, switches, and multiple access networks. Newer techniques such as the network calculus, the study of non-Poissonian long range dependent traffic sources, and applications to TCP, admission control, advanced packet switches and IEEE 802.11 networks will be introduced.

Prerequisites: EL 5363 and EL 6303

Add: Note: Course descriptions for CS6843, CS6373, CS6133, CS6233, CS6273, CS6823 are not provided here. Please see program descriptions for the Computer Science Graduate program.